



UNITED STATES DEPARTMENT OF COMMERCE
Patent and Trademark Office

Address: COMMISSIONER OF PATENTS AND TRADEMARKS.
Washington, D.C. 20231

me

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
-----------------	-------------	----------------------	---------------------

09/375,627 08/17/99 LOSCHNER

H 99108

EXAMINER

MMC2/0126

THOMAS R VIGIL
VIGIL & ASSOCIATES
836 SOUTH NORTHWEST HIGHWAY
BARRINGTON IL 60010

QUASH, A

ART UNIT

PAPER NUMBER

2881

DATE MAILED:

01/26/01

Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trademarks

Office Action Summary

Application No.

09/375,627

Applicant(s)

LOSCHNER ET AL.

Examiner

Anthony Quash

Art Unit

2881

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on _____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-28 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-28 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claims _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are objected to by the Examiner.
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. & 119(e).

Attachment(s)

- 15) ☒ Notice of References Cited (PTO-892)
- 16) ☒ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 17) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 4.
- 18) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 19) ☐ Notice of Informal Patent Application (PTO-152)
- 20) ☐ Other:

Art Unit: 2881

Priority

Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Drawings

INFORMATION ON HOW TO EFFECT DRAWING CHANGES

1. Correction of Informalities -- 37 CFR 1.85; 1097 O.G. 36

New formal drawings must be filed with the changes incorporated therein. The art unit number, application number (including series code) and number of drawing sheets should be written on the reverse side of the drawings. Applicant may delay filing of the new drawings until receipt of the "Notice of Allowability" (PTOL-37 or PTO-37). If delayed, the new drawings **MUST** be filed within the **THREE MONTH** shortened statutory period set for reply in the "Notice of Allowability" to avoid extension of time fees. Extensions of time may be obtained under the provisions of 37 CFR 1.136(a) for filing the corrected drawings (but not for payment of the issue fee). The drawings should be filed as a separate paper with a transmittal letter addressed to the Official Draftsperson.

2. Corrections other than Informalities Noted by Draftsperson on form PTO-948.

All changes to the drawings, other than informalities noted by the Draftsperson, **MUST** be made in the same manner as above except that, normally, a highlighted (preferably red ink) sketch of the changes to be incorporated into the new drawings **MUST** be approved by the examiner before the application will be allowed. No changes will be permitted to be made, other than correction of informalities, unless the examiner has approved the proposed changes.

Timing of Corrections

Applicant is required to submit acceptable corrected drawings within the three month shortened statutory period set in the "Notice of Allowability" (PTO-37). Within that three month period, two weeks should be allowed for review of the new drawings by the Office. If a correction is determined to be unacceptable by the Office, applicant must arrange to have an acceptable correction re-submitted within the original three month period to avoid the necessity of obtaining an extension of time with extension fees. Therefore, applicant should file corrected drawings as soon as possible.

Art Unit: 2881

Failure to take corrective action within the set (or extended) period will result in **ABANDONMENT** of the application.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1,3,4,7-12,16-21,25,28 are rejected under 102(b) as being unpatentable over Ando [105] as disclosed by applicant. As per claim 1, Ando [105] discloses an apparatus for multi-beam lithography by means of electrically charged particles, having a particle source, at least one aperture plate, a plurality of apertures wherein for each sub-beam a deflection unit is provided. See Ando [105] abstract, fig. 8, and col. 7 lines 50-60, and col. 3 lines 55-70.

As per claim 3, Ando [105] discloses that the electrically charged particles are ions. See Ando [105] col. 3 lines 1-6.

As per claim 4, Ando [105] discloses that the first aperture plate defines the size and shape of the sub-beam cross-section. See Ando [105] col. 5 lines 35-60, and fig. 5.

As per claim 7, Ando [105] discloses that the multi-beam optical system is realized as an electrostatic lens column array. See Ando [105] col. 3 lines 18-30.

As per claim 8, Ando [105] discloses that for each sub-beam an electrostatic lens arrangement is provided. See Ando [105] col. 3 lines 6-15.

As per claim 9, Ando [105] discloses that the electrostatic lens arrangement is placed within the multi-beam optical system. See Ando [105] col. 5 lines 25-35.

As per claim 10, Ando [105] discloses that the deflection units are electrostatic multi-pole electrode systems. See Ando [105] col. 4 lines 4-10.

Claim 11 is rejected as being inherent in view of Ando [105]. It is inherent that the electrostatic multi-pole electrode systems would be produced by means of micro-fabrication methods, e.g. using semiconductor technology.

As per claim 12, Ando [105] discloses that the deflection units of the sub-beams are organized in groups wherein the controlling of the beam positioning of the sub-beams can be performed synchronously for each group. See Ando [105] fig. 7 and fig. 8.

As per claim 16, Ando [105] discloses that the deflection unit is integrated into one or more of the electrodes forming the electrostatic lens arrangement. See Ando [105] co. 6 lines 20-35 and fig. 8.

As per claim 17, Ando [105] discloses that the deflection units are sectors of at least one angular unit around the apertures and that the sectors are electrically insulated from one another. See Ando [105] col. 8 lines 13-30, figs. 8 and 10.

As per claim 18, it is inherent in Ando [105] that the deflection unit is a travelling wave deflector since the deflector is deflecting ion beams. Ando [105] also discloses that the deflector means be comprised of poles segmented in axial direction forming segments.

As per claim 19, Ando [105] discloses a method for multi-beam lithography by means of electrically charged particles using an apparatus to form a beam from a particle source, forming a plurality of sub-beams from at least one aperture plate,

Art Unit: 2881

focusing beams on the substrate, and controlling the beams by deflection units. See Ando [105] abstract, columns 3,5,7 and fig. 8.

As per claim 20, Ando [105] discloses a method where the sub-beam diameter is adjusted by the electrostatics lens. See Ando [105] col. 3 lines 6-15.

As per claim 21, Ando [105] discloses a method where the sub-beams are controlled in groups. See Ando [105] fig. 7 and fig. 8.

As per claim 25, Ando [105] discloses a method where the first aperture plate defines the size and shape of the sub-beam. See Ando [105] col. 5 lines 35-60 and fig. 5.

As per claim 28, Ando [105] discloses a method where the focusing of the sub-beams onto the surface of a substrate is done by means of an electrostatic lens column array. See Ando [105] col. 3 lines 6-30.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 2,13,14,22,23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ando [105] in view of Nakasugi [211]. Ando [105] teaches all aspects of the claim except that apparatus is comprised of a collimator. However Nakasugi [211] does teach multi-beam lithography apparatus being comprised of a collimator. See Nakasugi [211] abstract. Therefore, it would have been obvious to a person of ordinary skill in the art

Art Unit: 2881

at the time the invention was made to add a collimator to a multi-beam lithography apparatus in order to assist in aligning the multiple beams as taught in Nakasugi [211].

As per claims 13,14,22,23 Nakasugi [211] teaches the claimed invention except for a reference plate being used for alignment of the optical system, and adjusting the optical system with respect to the reference plate. It would have been obvious to one having ordinary skill in the art at the time the invention was made to use reference marks made on the substrate for alignment and positioning of the optical system since the examiner takes Office Notice of the equivalence of the reference marks and the reference plate for their use the lithography art and the selection of any of these known equivalents to reference plates would be within the level of ordinary skill in the art. See Nakasugi [211] col. 4 lines 35-60.

Claims 5,6,26,27 rejected under 35 U.S.C. 103(a) as being unpatentable over Ando [105] in view of Mankos [039]. Ando [105] teaches all aspects of claims 5 and 26 except that the multi-beam system should have a demagnification factor of at least 20:1. However Mankos [039] does teach a charged particle beam apparatus having a demagnification of factor of at least 20:1. See Mankos [039] col. 1 lines 64-68 and col. 2 lines 1-5. Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made make the apparatus have a demagnification factor of at least 20:1 in order to achieve a certain resolution on the writing plane of the substrate as taught in Mankos [039].

As per claims 6, 27, Ando [105] in view of Mankos [039] teach the claimed invention except for the apparatus having a demagnification of at least 400:1. It would

Art Unit: 2881

have been obvious to one having ordinary skill in the art at the time the invention was made make the demagnification factor 400:1, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or working ranges involves only routine skill in the art. In re Aller, 105 USPQ 233.

Claims 15,24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ando [105] in view of Le Poole [196]. Ando [105] teaches all aspects of the claims except that there are several aperture plates penetrated by the sub-beams. However Le Poole [196] which is part of the applicants disclosure, teaches this. See Le Poole [196] abstract, col. 2 lines 18-39, and fig. 2. Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to add several aperture plates which are penetrated by the sub-beams, to aid in spot-shaping as taught in Le Poole [196].

Conclusion

The follow patents are considered pertinent to the applicant's disclosure. Patents 5,359,202 by Yasuda, 5,841,145 by Satoh, and 5,977,548 by Oae. These patents are considered pertinent to applicant's disclosure due to their discussions of charged particle beam exposure devices containing apertures for making sub-beams.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Anthony Quash whose telephone number is (703)-308-6555. The examiner can normally be reached on M-F from 9 a.m. to 5 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Teresa Arroyo, can be reached on (703)-308-7722. Any inquiry of a general

Art Unit: 2881

nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703)-308-0956.



A. Quash 1/23/01



TERESA M. ARROYO
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800